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Randomised Field Trial for the Methodological Evaluation of Manufacturing Systems and Yield Optimisation in Tanzanian Plants

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ABSTRACT

Background: Manufacturing systems in developing economies often operate below optimal yield due to a lack of empirical, context-specific methodologies for process evaluation and improvement. Existing frameworks are frequently derived from industrialised contexts and lack rigorous field validation in settings with distinct infrastructural and operational constraints.

Purpose and objectives: This study aimed to develop and test a novel methodological framework for evaluating and optimising production yield in manufacturing plants. The primary objective was to quantify the efficacy of a structured intervention package through a randomised field trial, comparing yield outcomes against standard practice.

Keywords: *Manufacturing systems, Yield optimisation, Randomised field trial, Sub-Saharan Africa, Process evaluation, Industrial engineering*

Article Highlights

- Randomised field trial shows 17.3% mean yield increase from structured intervention.
- Greatest gains observed in plants with initial yields below 65%.
- Mixed-effects model confirms significant effect versus control group practices.
- Provides evidence for adapting systematic methodologies to local constraints.

Methodological Insight

The study employed a plant-level randomised controlled trial with a mixed-effects analytical model, clustering robust standard errors to account for site-specific variations.

This article presents primary results from a comparative field trial in Sub-Saharan Africa.